

WHAT IS CLAIMED IS:

1. An internal combustion engine that compresses an air-fuel mixture of a fuel and the air and makes the compressed air-fuel mixture subjected to combustion in a combustion chamber to generate power, said internal combustion engine comprising:

5 a compression ratio varying mechanism that varies a compression ratio as an indicator representing a degree of compression of the air-fuel mixture;

10 a compression ratio control module that controls actuation of said compression ratio varying mechanism, so as to regulate the compression ratio according to a driving condition of said internal combustion engine;

15 a failure detection module that detects occurrence of a failure in said compression ratio varying mechanism; and

20 a specific control restriction module that, in response to detection of the occurrence of a failure, restricts execution of a specific control that has adverse effects on stable combustion of the air-fuel mixture.

2. An internal combustion engine in accordance with claim 1, wherein said compression ratio varying mechanism has a mechanism that changes over the compression ratio between at least two different levels, that is, a first compression ratio of a lowest level and a second compression ratio of a highest level, and said failure detection module detects a non-variable state of the compression ratio to at least the second compression ratio in

said compression ratio varying mechanism.

3. An internal combustion engine in accordance with claim 2, wherein said failure detection module detects a lock-in of said compression ratio varying mechanism at a compression ratio different from the second compression ratio.

4. An internal combustion engine in accordance with claim 1, said internal combustion engine further comprising:

10 an air-fuel ratio control module that sets an air-fuel ratio, which is an indicator representing a ratio of the air to the fuel included in the air-fuel mixture, equal to at least either of a stoichiometric air-fuel ratio, which ensures just sufficient combustion of the air and the fuel, and a lean air-fuel ratio, which 15 has insufficiency of the fuel to the air, according to the driving condition of said internal combustion engine,

wherein said specific control restriction module, in response to detection of the occurrence of a failure, restricts the control of setting the lean air-fuel ratio to the air-fuel ratio of the 20 air-fuel mixture.

5. An internal combustion engine in accordance with claim 1, said internal combustion engine further comprising:

an ignition module that emits a spark at a preset timing in 25 the combustion chamber to start combustion of the compressed air-fuel mixture;

a cold state detection module that detects that said internal

combustion engine is in a cold state; and

a cold-state ignition delay control module that, when said internal combustion engine is in the cold state, controls said ignition module and carries out an ignition delay control to retard
5 a timing of emitting the spark from the preset timing,

wherein said specific control restriction module restricts execution of the ignition delay control, in response to detection of the occurrence of a failure.

10 6. An internal combustion engine in accordance with claim 1, said internal combustion engine further comprising:

an EGR mechanism that recirculates part of a combustion exhaust, which is produced by combustion of the air-fuel mixture, to the combustion chamber; and

15 an EGR control module that controls the amount of the recirculated combustion exhaust by operating said EGR mechanism according to the driving condition of said internal combustion engine,

wherein said specific control restriction module restricts the
20 recirculation by said EGR mechanism, in response to detection of the occurrence of a failure.

7. An internal combustion engine in accordance with claim 1, wherein said failure detection module detects a lock-in of said
25 compression ratio varying mechanism, and

said specific control restriction module comprises an allowable control specification storage module that stores an allowable

control specification of the specific control corresponding to each lock-in compression ratio, at which said compression ratio varying mechanism is locked in,

5 said specific control restriction module restricts execution of the specific control to the allowable control specification corresponding to the lock-in compression ratio.

8. An internal combustion engine in accordance with claim 1, said internal combustion engine further comprising:

10 an intake conduit that leads a supply of intake air to the combustion chamber;

 a first fuel injection valve that injects the fuel in the intake conduit;

15 a second fuel injection valve that injects the fuel into the combustion chamber; and

 a fuel injection control module that actuates at least one of the first fuel injection valve and the second fuel injection valve to inject the fuel according to the driving condition of said internal combustion engine,

20 wherein said specific control restriction module restricts actuation of the first fuel injection valve to inject the fuel, in response to detection of the occurrence of a failure.

9. A control method of an internal combustion engine that compresses an air-fuel mixture of a fuel and the air and makes the compressed air-fuel mixture subjected to combustion in a combustion chamber to generate power, said control method comprising the steps

of:

controlling actuation of a compression ratio varying mechanism, which varies a compression ratio as an indicator representing a degree of compression of the air-fuel mixture, according to a driving condition of said internal combustion engine, so as to regulate the compression ratio of said internal combustion engine;

detecting occurrence of a failure in said compression ratio varying mechanism; and

restricting execution of a specific control that has adverse effects on stable combustion of the air-fuel mixture, in response to detection of the occurrence of a failure.